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FUNCTIONAL SPECIFICATIONS: THE ARMY EDUCATION
INFORMATION SYSTEM (ARIES)

JoAnn H. Bowlsbey and Carol Rabush
Discover Foundation, Inc.

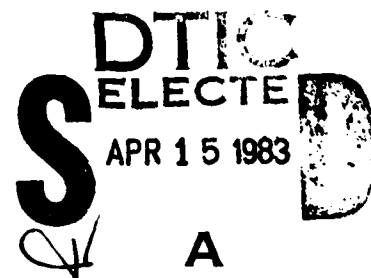BASIC SKILLS INSTRUCTIONAL SYSTEMS TECHNICAL AREA

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This document provides the details and specifications for the completion and implementation of the Army Education Information System (AREIS). AREIS is a computer-based educational and vocational guidance system. A plan for a field tryout of the completed system and evaluation is also provided. Additionally, the document provides background information on computer-based educational information systems.

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I. INTRODUCTION

Overview of This Document

The purpose of this document is to provide the details and specifications needed for completion and implementation of the ARFIS system. The document provides some background information about computer-based educational information systems in general and an overview of the ARFIS system as conceptualized under this contract. The tasks for completion of the conceptualized system and projected time for doing so are detailed. The hardware and software requirements for implementation of the system by means of both a distributed network model and a micro-computer model are stipulated in detail. Needed system support materials, including plans for inservice training of four different personnel groups, are described. Finally, a plan for a field tryout of the completed system and evaluation is proposed.

Background

Over the past fifteen years, experience with more than thirty computer-based guidance systems has shown their effectiveness in the delivery of guidance services to a wide range of civilian populations. Such systems have unique capabilities which ultimately enhance the guidance process; specifically, they can

1. store, search, retrieve, and update large data files of occupational and educational information;

2. relate self-information of the user to information about occupations and educational alternatives;

3. simulate an interactive dialogue; and

4. provide individualized attention to many users simultaneously.

Because computers carry out the routine, often repetitive information capturing and dispensing functions, Counselors can concentrate on the more professional activities involved in the counseling process: synthesis, interpretation, counseling, and consultation.

Research has identified several specific benefits which have accrued from the use of the computer in the counseling process:

1. Receiving information by computer is perceived by users as a more interesting method than other traditional means.

2. Use of a computer-based guidance system increases awareness of educational and vocational options.

3. A computer-based guidance system permits users to expand or narrow their exploration of occupational or educational alternatives in accord with their current stage in the decision-making process.

4. Users increase their exploratory behavior after leaving the computer-based guidance experience.

5. Use of a computer-based guidance system increases cognitive knowledge about occupations and/or educational programs researched by the users.

6. Use of a computer-based guidance system increases self-information and an awareness of the relationship of self-information to occupational choice.

7. Use of a computer-based guidance system enhances vocational maturity and develops the decision-making skills of users.

8. Use of a computer-based system maximizes the career guidance gains which can be effected by counselors.

The Army, recognizing that the computer can be effectively integrated into the total counseling process, charged the Army Research Institute for the Behavorial and Social Sciences to conduct research on a computer-based system which would provide information about the Army Continuing Education System (ACES) programs to military personnel through its Army Education Centers. The DISCOVER Foundation, with more than twelve years' experience in the field, was tasked under Contract MDA 903-79-C-0279 to conceptualize, develop, and test a prototypal system, the Army Education Information System (ARFIS).

Overview of the Army Education Information System (ARFIS)

ARFIS, as conceptualized under this contract, is a computer-based information system which has two separate, though interacting, parts. The first part has three components which provide military personnel with interactive, instructional dialogues (or modules), and supporting data files; the second part includes direct access functions for the professional personnel of the Education Center. Graphically, ARFIS takes this shape:
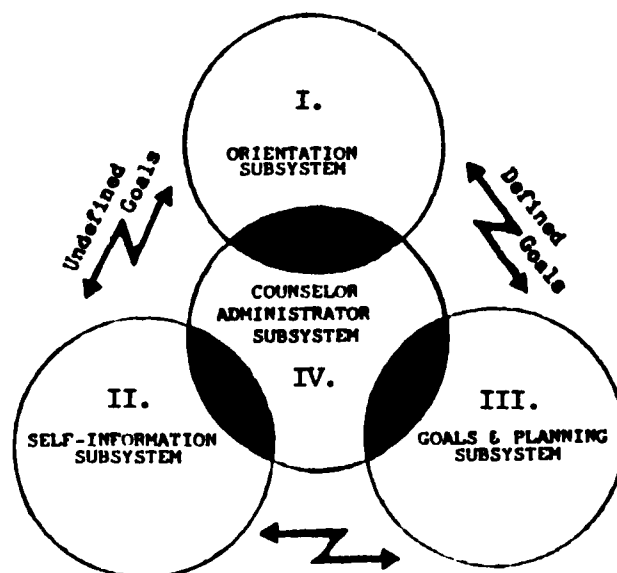

Figure 1

The Relationship Between
the Four Components of ARFIS

The first part of ARFIS contains three subsystems. Subsystem I, ORIFNTATION, always the entry point for the soldier, has four objectives: 1) to familiarize the user with the terminal and printer equipment; 2) to provide instruction about the content of ARFIS; 3) to explain the services of the Education Center; and, 4) to provide an overview of all Army Continuing Education System programs. Subsystem II, SELF-INFORMATION, is designed to help soldiers generate information about themselves which they can use to formulate short- and/or long-range goals for the time they are on active duty and beyond. Soldiers who feel that they need more information about their work-related interests, aptitudes or skills, and values can interact with this subsystem. Subsystem III, GOALS AND PLANNING, has two purposes: 1) to help soldiers identify relevant personal goals, either short- or long-range, which are related to career and education; and 2) to provide detailed information about ACES programs which will assist in the achievement of these goals. Twelve goals were conceptualized as important in this subsystem:

1. to improve basic skills
2. to develop new interests for self-improvement or use of leisure time
3. to get some job skills
4. to complete a next step in education (including suboptions to complete high school, community college, four-year college, or graduate school)
5. to plan a military career
6. to improve MOS proficiency
7. to select a secondary MOS
8. to get promoted
9. to make a good decision about re-enlistment
10. to make a vocational choice
11. to complete an educational degree after leaving the military
12. to make the Army a career.

The Soldier Subsystems of ARFIS are designed to be flexible; that is, soldiers may move about among them in any manner appropriate to their needs.

The second part of ARFIS, COUNSELOR-ADMINISTRATOR Subsystem IV, has two basic purposes: 1) to relieve Education Counselors of clerical functions which they currently perform; and 2) to provide Counselors with up-to-date, accurate information for use during counseling interviews. This subsystem is divided into two areas. The shaded areas (See Figure 1) contain data files such as descriptions of Military Occupational Specialties, civilian occupations, and educational alternatives which can be accessed by the soldier through the interactive dialogue process or directly by the Counselor or Education Services Officer administrator of the Education Center. The non-shaded area, designed for use by Education Center professional personnel only, contains functions such as the computer storage of the Soldier Educational Development Record (DA Form 669), of a master schedule of courses offered on or near the post, and of all course rosters.

At the completion of this contract, the following portions of the total ARFIS system have been developed, programmed, and field-tested:

1. All of Subsystem I, ORIENTATION: an overview of the content of the system, of the services of the Education Center, and of the various programs offered through the ACES.

2. One section of Subsystem II, SELF-INFORMATION: the UNIACT IV Interest Inventory (© 1978, American College Testing Program).

3. One goal of Subsystem III, GOALS AND PLANNING: the goal entitled "To complete a next step in education," which provides detailed information about the educational offerings on or near a specific Army post.

4. A demonstration of Subsystem IV, COUNSELOR-ADMINISTRATOR SYSTEM: displays of the Form 669, new regulations from Department of the Army, and other administrative functions for Counselor or Education Services Officer use.

In addition, the following products have been delivered to the Army Research Institute for the Behavorial and Social Sciences by the DISCOVER Foundation:

* ACES Needs Assessment Survey

* The Army Information System (ARFIS): A Conceptualization

* Field Tryout of the Army Education Information System (ARFIS)

* Cost/Benefit Analysis of the Army Education Information System

II. FUTURE DEVELOPMENT OF ARFIS

Approximately two-thirds of Subsystem II, almost all of Subsystem III, and some of the administrative functions in Subsystem IV remain to be developed. Development to date has been done under PLANIT, an author language utilized by the Army, and some significant limitations were identified. These include inability to clear the screen completely, to stay in communication with the computer after more than a five-minute delay between users, and to search data files. Since data file searching is a critical function in the remaining subsystems of ARFIS, it is mandatory that an authoring system which has this capability be adopted for future development. The existence of such an authoring system is assumed in the ensuing discussion of the completion of ARFIS.

The necessity for an author language is at two distinct levels: a level required for initial authoring and development of the remainder of the system and a different level for use by Education Service Officers, Counselors, and clerical personnel after the system is complete and operational. During the completion of development, the author language must have the following characteristics:

1. It allows easy input and revision of text and linkages.
2. It allows the creation of data files (such as occupations, MOS's, colleges, etc.) on-line.

It is also highly desirable that the language allow the input of graphic material and of symbols which create color. Further, it is desirable that the language allow the development of search strategies on-line, although this task can also be accomplished by special application programming.

Because of these requirements for the author language and because of the total disk and core requirements for the system, it is recommended that the development of the system be done on a computer which has more resources and power than the one on which the system will ultimately become operational. Once the system is complete and tested, much of the high overhead required by the powerful authoring language can be removed and a more basic package of software can be installed for operation.

Once ARFIS is operational in Education Centers, a much less powerful authoring capability is needed. The requirements of this author system are as follows:

1. It allows the updating of specifically-designated frames of text, such as the scheduling of courses on or near post or the local alternatives for completion of a high school diploma.

2. It allows the creation and updating of the Soldier Educational Development Record (Form 669).

Limiting the author capabilities to these two functions effects a significant saving in machine and file resources and protects the integrity of the system.

Estimated Development Tasks

Subsystem I

Subsystem I is now complete and ready to be operationalized on any machine
which has PLANIT installed. If changes occur in ACES programs before the time of
implementation, minor text updating may be required. Should a decision be made to
run ARFIS on a microprocessor (see later discussion of this alternative on page 14),
or another type of machine which cannot handle PLANIT, reprogramming or reentry
of this subsystem (and all other material which has been developed) under a different
author language would be required.

Subsystem II

This subsystem offers the user three options: 1) to take an interest
inventory and find MOS's and occupations which are related to the assessed interests;
2) to assess skills or aptitudes and identify MOS's and occupations which are
related to these; and 3) to rate the importance of 10-15 work and military-related
values and to identify MOS's and occupations which have potential to fulfill these.

Most of the development of the first option has been completed. Users
respond to a sixty-item interest inventory, called UNIACT IV (c American College
Testing Program, 1978). Computer calculation of user responses "plots" the
individual into one of the 12 regions on the World of Work Map (c American College
Testing Program, 1978) depicted in Figure 2. Based on ten years of extensive
research, the American College Testing Program has grouped all of the occupations
in the Dictionary of Occupational Titles in 25 families of occupations. These
families are plotted on the Map by factor analysis of the work tasks involved in
them and their relative degree of involvement in working with data versus ideas
(the vertical dimension) and with people versus things (the horizontal dimension).
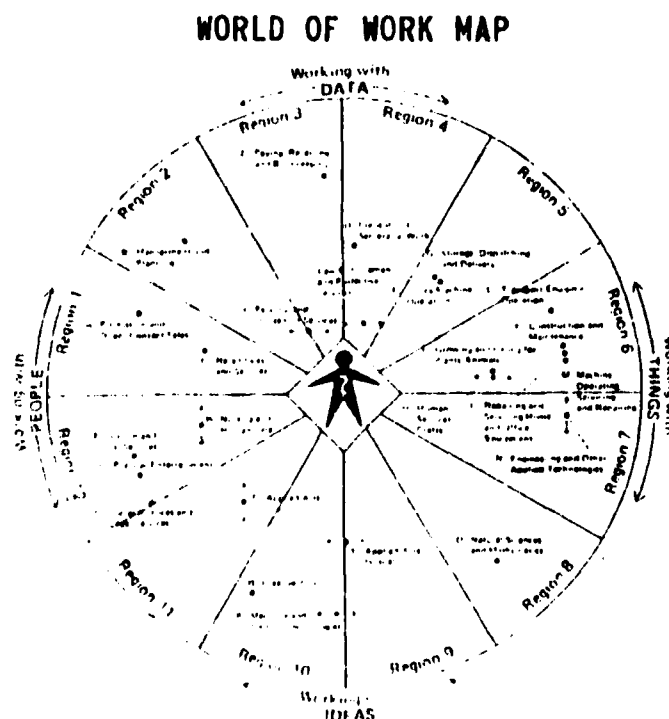
WORLD OF WORK MAP

Figure 2

The World of Work Map

Scoring of the UNIACT interest inventory allows the computer to suggest that the user begin by exploring occupations in the one region where the score fell and to continue by exploring occupations in the contiguous regions. The system asks the user to stipulate an educational entry level, and this allows the computer to produce a manageable number of occupations for further exploration.

In order to complete the objectives of this exercise, it is necessary to also relate interest inventory scores to MOS's. Although this has not been done in this initial feasibility study, it is not anticipated that this task will be difficult for two reasons. First, the Appalachia Educational Laboratory has already related MOS's to Worker Trait Groups in the Dictionary of Occupational Titles, and this relationship has been published in The U.S. Army Career and Education Guide, Counselor Edition. (Washington, D.C.: Department of the Army, Undated). Further, the American College Testing Program has worked on this relationship, and they will share their work in this area with the DISCOVER Foundation.

The module on the relationship of skills or aptitudes to occupations and MOS's has not yet been developed. It is proposed that two methods of relationship be offered--by Armed Services Vocational Aptitude Battery (ASVAB) scores and by self-analysis of skills related to working with data, people, things, and ideas. In the first proposed method, it would be essential that ASVAB scores be stored on all Forms 669 and that the computer software access these when the soldier enters this part of the module. The computer text would review the soldier's ASVAB scores, interpret them and then produce a list of MOS's and civilian occupations for which the soldier appears to have aptitude. The relationship between ASVAB scores and MOS's has already been done and is published in The U.S. Army Career and Education Guide, Counselor Edition, Undated. The relationship between ASVAB scores and occupations can be done by utilizing the work already done on the Differential Aptitude Tests (New York: The Psychological Corporation, 1947), and the General Aptitude Test Battery (Washington, D.C.: The Government Printing Office, 1946-1963).

For the soldier who does not have ASVAB scores on his/her record or for whom these do not appear to be appropriate indicators of aptitude, a second approach will be offered--the self-assessment of skills acquired through experience and course work. The World of Work Map (See Page 6) groups occupations (and MOS's after the work previously described is completed) by their relationship to working with data, with people, with things, (tools, equipment), or ideas. Working in each of these four dimensions requires a quite different set of skills. These skills have been enumerated by the American College Testing Program as a result of analyzing the work tasks involved in the occupations in these four quadrants. This part of the module, then, would list a set of 10-15 critical skills in each of these four areas and ask the user to indicate whether he or she has many, some, or few skills from this group. This self-assessment of skills, then, can be directly linked to occupations and to MOS's.

The third area of Subsystem II relates to the assessment of work-related values. Much research has already been done on this topic. The developers would secure permission to use already-developed materials (such as those developed by the Educational Testing Service or the DISCOVER Foundation) in which specific ratings on each value have been assigned to hundreds of specific occupations. Military values, such as fitness and appearance, would be added to the existing file. A panel approach to weigh these additional values would be as follows:

1. The panel would develop an operational difinition at three levels (low, medium, high) for military values.

2. Each member of the panel would independently rate the potential for fulfillment of that value by each occupation and MOS using knowledge of the occupation or MOS or using objective sources of occupational and MOS information.

3. The panel would check and discuss agreements and/or disagreements in value weightings and come to a consensus.

The military values would then be added to the values section of an existing database, such as that developed by the DISCOVER Foundation, and ARFIS would be programmed to produce lists of occupations and MOS's which would combine desired values.

Subsystem II would conclude with a review section which 1) summarizies or synthesizes the interest, aptitude/skill, and values assessment, and 2) consolidates a list of occupations and MOS's which relate to the self-information given by the user.

Subsystem III

Since the material for only one goal of the projected eleven goals to be covered in Subsystem III has been developed, a great deal of new development remains to be done here. As with all new development of instructional text, the following steps would have to be followed:

1. Collect, read, and organize all of the information needed to write the required text.

2. Outline the material in the way in which it is to be presented to the user and determine the methods to use (i.e., question and answer, narrative, simulation, etc).

3. Write the text in the exact format desired with linkage instructions, following these guidelines:

   a. Reading level should be appropriate to the target population
   b. Text should be concise and as interactive as possible
   c. Interest level should be high, aided by occasional humor and the use of graphics
   d. Text should allow ample opportunity for the user to exit from the material and/or choose another subsystem
   e. Instructions should be very clear so that human assistance is not required.

4. Enter the text and the linkages into AREIS using the selected author language.

5. Edit the text for accuracy, appearance, and linkages.

6. Design, secure, and enter the data files required for search strategies, such as possible files of apprenticeship programs, SOC colleges, and occupational descriptions.

Subsystem IV

Subsystem IV, Counselor-Administrator System, has two basic objectives:

1. to relieve Counselors of clerical work
2. to provide Counselors with up-to-date, accurate information which can be used in the counseling process.

Four functions have been conceptualized to meet these objectives:

1. the computerization of DA Form 669
2. the computer storage of a master schedule of all courses available on or near post
3. the direct access recall of all data files which support Soldier Subsystems I, II, and III
4. the author capability to enter and/or edit designated frames of text.

During this contract a demonstration package was developed under PLANIT to illustrate the Counselor-Administrator Subsystem. This demonstration included all of the elements of the Form 669 in four displays (Personal Data, Education Information, Test Information, and Counseling Notes), a frame for the entry of changes to Department of Army Regulations, a frame for the master schedule of courses, and a frame for the entering of course rosters.

In order to complete the Counselor-Administrator Subsystem, the following tasks must be accomplished:

1. Application programming must be done to allow AREIS to retrieve records from a data file.

2. A method must be designed for the entry of Forms 669 for all soldiers on a given post.

3. A method must be designed and tested with Counselors and clerical personnel for the collection of data for the building of new records or the updating of old ones.

4. A method must be designed and tested for the transmission of Forms 669 from one post to another.

5. A method must be designed for transmission of new information from the Education Directorate through MACOMs to individual posts.

6. Decisions must be made about the author language to be used, the restrictions to be placed upon its use, and specifically which frames of the ARFIS system can be modified at the local level.

7. The direct access recall of data files (such as occupation or MOS descriptions) which support Soldier Subsystems I, II, and III must be designed and implemented.

Estimated Development Time

The development work necessary to complete ARFIS can be divided into two distinct phases:

1. The text and file development phase, consisting of the review of previously developed material and the creation of text and data files for all new applications.

2. The technical implementation phase, consisting of the reprogramming of all previously developed text (if PLANIT is not retained as the authoring system), the programming of all new text and supporting data files, and the completion of special application programming needed in order to store and retrieve Forms 669 and to perform search strategies needed in Subsystems II and III.

It is estimated that the first phase can be completed within a twelve-month period by a staff of three persons:

1. Project Director who will be responsible for

    a. the design of all undeveloped parts of the AREIS
       system.
    b. the identification and acquisition of all materials needed
       for text and data file development.
    c. the management and coordination of work tasks and personnel.
    d. liaison with the funding agency.
    e. quality control over all AREIS system material and reports
       to the funding agency.

2. Script Writer who will be responsible for

    a. review of existing text for possible updating.
    b. reading source documents and writing text in accordance
       with an agreed-upon outline and guidelines for text
       preparation.
    c. assistance with data file development.

3. Secretary who will be responsible for

    a. typing all material related to the project.
    b. managing the daily operation of the project, such as
       time accounting and preparation of fiscal reports.
    c. other activities as assigned by the Project Director.

This staff will be supplemented by consultants who are needed to provide specialized information and assistance. Examples would be the relating of interest inventory scores to MOS's, the addition of military values to an existing file of values, and the assigning of weightings to occupations and MOS's.

III. HARDWARE AND SOFTWARE REQUIREMENTS FOR ARFIS

The Cost/Benefit Analysis of the Army Education Information System (ARFIS) detailed three possible modes of delivery of ARFIS: the maxi-computer, the distributed network of mini-computers, and the stand-alone micro-computer. In that report the distributed network of mini-computers and the stand-alone micro model were favored over the maxi-computer. The mini-computer distributed network had the distinct advantage of meeting all of the criteria set for delivery of ARFIS. Although it failed to meet the criterion of direct communication of soldier educational development records (DA Form 669) by phone line from one computer to another, the micro-computer mode of delivery had the following advantages:

a. it has the highest cost feasibility,
b. the Education Center is directly involved with the operation and maintenance of the system,
c. the system can be maintained with a minimum of technical and clerical support,
d. overall system operation would be easy for non-technical people, and
e. this model would fit all posts, including remote overseas installations.

Both of these modes are entirely feasible; the requirements which pertain to each are detailed.

Hardware

The distributed network model assumes that there would be a network of mini-computers which are linked together (maxi-computers and micros could also be utilized in the chain). There are two purposes for this linkage: a) the transmission of soldier records and other information from post to post and b) the provision of service from a distant computer if the usual host computer is "down." Implementation of a completed ARFIS product under this model assumes the following:

1. Posts in the continental United States and in other commands would be grouped in some logical way which accounts for a) the total soldier population in each group, b) the geographic proximity of posts, and c) the command to which each reports.

2. Mini-computers of varying size would be leased or purchased, one for each group of posts. The mini-computer for each group should be selected to meet the following criteria:

   a. Sufficient core storage for an authoring language such as PLANIT. This software, if used, requires 256K bytes.

b. Sufficient disk storage for ARFIS plus that needed for other desired applications. It is anticipated that the completed ARFIS will require approximately 20M bytes of disk storage, including all of its data files.

c. Ability to handle one cathode ray tube terminal and printer for each 2000 soldiers on the posts included in the region, plus one terminal dedicated to counselor use in each Education Center and telecommunication between those terminals and the central computer.

d. Ability to provide response time of five seconds or less.

3. Standard 1920-character cathode ray tube terminals and associated printers would be selected and placed in Education Centers on posts in the region at the ratio of one terminal per 2000 soldiers plus one dedicated one for Counselor/clerical use in each Education Center.

4. These terminals would be linked by a 1200-baud dial-up phone line and acoustical couplers to the central mini-computer.

5. The operating software and the ARFIS software would be installed in each of these mini-computers.

6. A technical person at the computer site would be assigned responsibility for operation and maintenance of the software and for interface with user sites.

The stand-alone micro-computer model assumes that a microprocessor would be placed on posts to deliver ARFIS. These processors can handle from one to four cathode ray tube terminals and an associated printer. Implementation of this model requires the following specific steps:

1. Decisions would be made, based upon the soldier populations, about how many microprocessors would be needed at each post and where these should be placed. Since a ratio of one terminal to 2000 soldiers is recommended, plus one terminal dedicated to Counselor/clerical use in each Education Center, one microprocessor could serve from 2000-8000 soldiers depending upon the number of terminals attached. Assuming that the permanent party populations on posts is the same as that reported in the ACFS Needs Assessment Survey, (December 1979) completed under this contract. Examples of requirements for microprocessors would be as follows:

Post	Number of Soldiers	Microprocessor Configuration
Fort Eustis, VA	7,200	One microprocessor, 4 cathode ray tube terminals, 1 printer.
Fort Polk, LA	15,000	* Three microprocessors, 13 cathode ray tube terminals, 5 printers.
Fort Bragg, NC	48,000	* Six microprocessors, 25 cathode ray tube terminals, 6 printers.

*The Education Center on this post is decentralized with one primary center and a number of satellite centers.

2. Microprocessors, cathode ray tube terminals, and printers would be selected and leased or purchased for placement on posts. The microprocessor would be selected with the following criteria in mind:

   a. Sufficient core storage for software to run AREIS.
   b. Sufficient disk storage for ARFIS.
   c. Ability to handle an author language which has a data base search capability (e.g., modified PLANIT or a substitute).
   d. Ability to handle color and graphics.
   e. Ability to handle up to four terminals and a printer.

3. Microprocessors, cathode ray tube terminals, and printers would be placed in Education Centers and/or other designated locations on posts.

4. The ARFIS software and author language would be installed in the microprocessors on posts and made operational.

5. Soldier records and/or information would be transmitted by mail between posts, MACOMS, and the Education Directorate by mailing of floppy disks, since no telecommunication between computers exists.

The distributed mini-computer network model and the microprocessor model are not mutually exclusive. Indeed, both models might be operationalized simultaneously. The mini-computer model lends itself well to the provision of service to posts which have a permanent party population of over 8,000 and which are geographically close to each other. The microprocessor model is best suited for small posts and/or isloated ones for which service from a centralized computer would incur high telecommunication costs. If one mode is selected over the other, the microprocessor model is recommended.

Authoring Software and Operating System

Based upon the field tryout of ARFIS at Fort Sill and the conceptual design of the system, there are very important requirements for the software which delivers ARFIS. These are as follows:

1. The software must be capable of doing file searches as well as displaying text, analyzing user input, and storing user records. The file-search capability is essential for allowing the soldier to identify occupations, MOS's, or educational institutions which have the combination of characteristics desired. It is also essential for providing the proposed administrative functions.

2. The software must have an easily understandable author language which allows personnel to localize frames of text designated for localization at the post level. Some samples of ARFIS related applications which require an author language follow:

   a. the insertion of information about courses given on or near post,
   b. the listing of local opportunities for obtaining the GED high school equivalency certificate, and
   c. the on-line maintenance of DA Form 669.

3. **The operating system must remain in continuous operation.** The system must be designed to remain available for soldier use once it has been initialized in the morning. When one user signs off, the software should loop back to the beginning of AREIS so that it is ready for the next user.

4. **The software must clear the screen after each display of text before displaying new text.** Messages should not move, or "scroll," up from the bottom of the screen in such a way that some part of one display may still be at the top of the screen as the next display rolls up from the bottom. Instead, the system should be designed to remove all of one display before beginning to print the text of the next frame at the upper left-hand corner of the screen.

In addition to these four requirements, if would also be highly desirable if the software would a) allow the user to print any frame directly from the screen of the cathode ray tube, and b) be capable of displaying color and graphic material.

IV. OPERATIONAL ENVIRONMENT

ARFIS is designed for use by Army enlisted personnel who are stationed on active duty at any installation throughout the world. This is not to say that ARFIS is restricted to use by this population; the field tryout of the system demonstrated that ARFIS has relevance for military personnel of all ranks who are seeking information about themselves, career possibilities, and educational alternatives.

ARFIS may also be used by various members of the Education Center staff, principally by the Education Counselors, as they provide educational counseling to service members or perform tasks which support the administrative functions of the Education Center, such as tallying of data from DA Form 669 for planning and reporting purposes.

Method of Use: Soldiers

ARFIS is designed to be used as an integral part of the total counseling process for soldiers who use the Education Center. It is not meant to replace the professional staff of the Education Center, but rather to be used as an adjunct tool which can facilitate the information-gathering and dispensing tasks performed by the Counselors.

Soldiers will be referred to ARFIS by the Education Counselors or other staff members when they come to the Education Center for counseling. It is also possible that soldiers will learn of the value of the system from other soldiers who have used ARFIS or as a result of a publicity campaign which might be undertaken on post (See Section VI).

ARFIS is designed to provide maximum flexibility of use. Soldiers may employ a straight-line approach when they enter at Subsystem I, move through Subsystem II, and conclude the ARFIS experience by using one or more of the goals combined in Subsystem III. They may also use an individualized approach in which they use only those sections of ARFIS which have particular interest or relevance for them. Hence, users who have no pre-determined goals might move through Subsystem I to Subsystem II and then to Subsystem III, while other users who have already formulated goals may move directly from Subsystem I to Subsystem III. Some users who have already used the system may wish to interact with one module of information only.

It is estimated that a soldier could use all of ARFIS in about 3-4 hours. Subsystem I should require approximately thirty minutes, as should each submodule in Subsystem II. Each of the twelve goals in Subsystem III should take approximately fifteen minutes to complete. It is likely that a soldier will interact with only one or two of these goals at any one time. He/she will probably return to ARFIS when information about a particular topic becomes important for his/her planning for the future.

Education Centers will need to make local policy determinations about how soldiers make arrangements for use of the ARFIS system. Such use might well be a blend of drop-in voluntary use, scheduled appointments, and required use as a part of particular programs (such as BSEP II or Basic Training). Drop-in use alone may be an inefficient use of the terminals since use may be very spasmodic.

Since enlisted personnel have a busy day-time schedule, it is highly desirable to be able to allow use during the evening hours. Securing permission from Commanding Officers for use of the system during day-time work and training hours is also highly desirable.

Method of Use: ESO's and Counselors

In the ACES Needs Assessment Survey (Bowlsbey and Rabush, 1979), Education Service Officers and Counselors indicated a high level of enthusiasm for a computer-based system to assist them with their administrative and clerical tasks. Computerized building, updating, and recall of the DA Form 669 for soldiers was identified as the top priority need with receipt of information about new programs or regulations from the Education Directorate and updates of existing ACFS information as close second and third choices. Computerization of these functions, especially the first one, will mandate that Counselors have access to cathode ray tube terminals.

In order to make this access to the Counselor/Administrator Subsystem of ARFIS possible at all times, it is strongly recommended that one terminal in each Education Center be dedicated to ESO/Counselor use. This terminal would be in addition to the 1:2000 ratio recommended for soldier use. Some posts may be able to afford the expenditure of providing a terminal in the office of each Counselor, and this, of course, would be an ideal situation.

In order to use the Counselor/Administrator functions, these personnel would have to go to the "dedicated" terminal, which should be placed in an open location easily accessible to the ESO and all Counselors. Counselors may want to do this before, during, or after a counseling interview. If the Counselor reviews a soldier record prior to an interview, he/she may want to print out all or some of the displays for use during the interview. During or after an interview, the Counselor may want to update information (such as the "Counseling Notes" display). Since access to the terminal will be impossible at some times or the system may be "down," it is recommended than an alternate mode of data entry to the Form 669 be designed. This might be a paper worksheet which is identical in layout to the displays in the system. The Counselors could enter information on this form, and this information could be entered by clerical personnel at a later time.

Location of the Equipment

ARFIS equipment should be located in the Education Center facility. As Army Education Centers are found in a wide variety of buildings, it is difficult to set precise requirements for the location of the ARFIS terminals. However, soldier terminals, printers, and possible micro-computers should be located in an area which offers an opportunity for exposure to a number of persons and yet provides some degree of privacy for the individual user; ESO/Counselor terminals should be in a central location in easy distance from Counselors, but should not be readily accessible to soldiers. The following information may be useful in determining placement:

1. There should be enough space for the terminal(s) and associated printer, a table on which the equipment sits, and a chair for the user.

2. The table area should be ample enough to allow the user to work with ARFIS-related materials, such as printouts of information, or with ancillary hard-copy materials.

3. The pieces of equipment must be connected to each other and to a power source. This power source should be a standard 120V wall outlet capable of accepting a three-prong plug. It is recommended that extension cords be avoided.

4. The computer terminal(s) and possible microprocessors should require no special environmental conditions such as temperature or humidity control. Any environment which is acceptable to humans is acceptable to this equipment also.

V. SYSTEM MAINTENANCE

Maintenance of AREIS software and hardware must take place at both the Education Directorate level and the MACOM/post level. The maintenance required at these two levels will be addressed in relation to both the distributed mini-computer network model and the micro-computer model.

Education Directorate Level

Certain functions in regard to AREIS must be initiated at this level in order to provide continuing support to the product. These functions are:

1. the development of general policy about the use of the AREIS system in conjunction with Education Center programs worldwide;

2. annual review of the text and files of the system and updating of these from a central source;

3. distribution of updated texts and files to Education Centers or their associated data processing centers;

4. provision of new information, such as new ACES programs or DA regulations, for entry into the Counselor/Administrator Subsystem;

5. initiation of an ongoing evaluation of the system;

6. monitoring of new technical developments which might improve the cost and/or effectiveness of the system; and

7. making of arrangements for acquisition of data files used in the system and the payment of rayalties (if any) on instruments used in the system.

It is recommended that a small coordinating committee be appointed to serve these functions. This committee should include representatives from Education Centers and from MACOM's.

These functions appear to be essential for both the distributed mini-computer network model and the micro-computer model. The physical form of items 3 and 4 would be different in the two models.

MACOM/Post Level

Assuming that the maxi-computer model will be rejected, all hardware maintenance will occur at the regional/post level. In the distributed network model, mini-computers will be located in regional centers while cathode ray tube terminals and printers will be located in each Education Center. Telephone equipment will be located in both places. In the micro-computer model, microprocessors, cathode ray tube terminals, and printers will be located in Education Centers. No telephone equipment will be utilized.

The equipment listed in the previous paragraph may be either leased or purchased. If it is leased, maintenance service is included in the monthly lease rates. If the equipment is purchased, it is recommended that a maintenance contract be negotiated with vendors or service companies. An alternative to this would be the acquisition of additional printers and terminals so that one of these can be substituted in the event of a mechanical problem. Some vendors of low-cost terminals, printers, and microprocessors now provide service by having the customer ship the piece of equipment to a service address. This process, while saving money for maintenance contracts, can cause operational delays of up to two weeks. Having some extra equipment to substitute would overcome this potential problem.

There is also a need for software maintenance. Such maintenance includes the operating system, the authoring language, and the ARFIS system itself. In the distributed network model, this maintenance would take place at the regional data processing center by staff designated for this purpose. The vendor of the mini-computers should provide maintenance and support of the operating system. The developers/owners of the authoring language should support it. ARFIS itself should be supported from two levels. Solution of technical bugs should be provided by technical staff in the regional data processing center. Application of update tapes (of text and data files) should also be done by this staff, and the tapes themselves should be provided to all regional data processing centers by the Education Directorate.

Maintenance of software would be somewhat different in the micro-computer model. A minimum of maintenance is anticipated on the operating system; if some problem were to arise, this would be the responsibility of the hardware vendor. In this model it is anticipated that both the authoring language and the ARFIS system would be maintained by one software developer. The Education Directorate would presumably contract with a software company to maintain both the authoring language and the ARFIS system. Such maintenance would include the application of the periodic update tapes which would be provided by the Education Directorate. The contractor would then provide periodic updates to Education Centers in the form of floppy disks. The same contractor would provide phone and on-site support to the software, if necessary.

In addition to the hardware and software maintenance described, it is also important to have local post involvement in the method of use, evaluation, and localization of ARFIS. It is proposed that a coordinating committee of Education Center staff members be selected at each post to oversee the operation of ARFIS. Members of this committee should assume responsibility for integrating ARFIS into the ongoing counseling program. This process includes the

1. determination of information about local post educational offerings which should be included in ARFIS.

2. design and implementation of procedures for information entry, update, and transmittal.

3. design and coordination of publicity programs about ARFIS.

4. coordination of inservice training of all Education Center personnel.

5. designation of personnel responsible for the various activities related to the ARFIS program within the Education Center.

VI. SUPPORT SERVICES

Any product or program, regardless of its quality, can fail if it does not have the required support services and materials. ARFIS is no exception. The support required for this product can be divided into four major categories--inservice training, user and professional guides and manuals, publicity, and communication. Each of these four topics is considered in detail.

Inservice Training

It is strongly recommended that inservice training be provided for four groups: Education Service Officers (ESO), Counselors, clerical support persons, and data processing technical personnel. Further, it is recommended that each of these groups have separate training because of the differences in their level of responsibility, work tasks, and prior knowledge. A suggested plan would be to train ESO's in small groups by geographic region or command. They should be the first to receive training since they must play the primary leadership role in implementation and successful use. Ideally, the other three groups would receive training on their respective posts so that local equipment can be used for demonstration purposes, and local practice problems of text development and maintenance can be tackled.

ESO Training: It is recommended that ESO's have a minimum of three days of training. This training could be done by thoroughly informed persons from the Education Directorate, or by contractors who learn the system thoroughly and specialize in training content and methodology. The training should contain a good blend of didactic material, demonstration, and "hands-on" experience. The training proposed here would be virtually the same for both the distributed network model and the micro-computer model.

The objectives for ESO training should insure that at the completion of training they would be able to

1. provide a factual description of the contents and functions of ARFIS;

2. provide a competent demonstration of the system to an Army officer, Counselor, or visitor;

3. conceptualize ways in which the system can be integrated into the total Education Center program and mission;

4. explain the process of localization, on-line updating, and maintenance of the system;

5. explain the process of transfer of Form 669 between posts; and

6. explain the staffing requirements for operation and maintenance of the system.

In order to meet these objectives the proposed workshop needs to address the topics listed below:

1. description with demonstration and visual material of the total conceptual design of the soldier part of the system
2. detailed description and demonstration of the Administrator/ Counselor Subsystem
3. "hands-on" use of both of the above
4. description and demonstration of a suggested demonstration package
5. suggested models and materials for incorporating AREIS into the present Education Center program for enlisted personnel
6. instruction about the specific parts of the system which need to be localized for each post and the procedure for accomplishing this
7. detailed instruction and documentation of the process for building, updating, and deleting the computerized Form 669 for soldiers on post
8. detailed instruction and documentation of the procedure for forwarding and receiving Forms 669 to and from other posts
9. detailed recommendations for staffing and training for implementation and operation of AREIS.

The meeting of the proposed objectives at a very high level is critical to the later success of AREIS on posts. It will succeed in Education Centers where the ESO is committed to the system, is not threatened by it, and feels that he/she possesses a high level of competence with it.

Education Counselor Training: It is recommended that Counselors have a minimum of two days of training on-site. This training may be provided by a thoroughly informed person from Education Directorate, by the ESO (who has been previously trained and has an Inservice Training Manual to help him/her), or by a contractor. The training would be virtually the same for both the distributed network model and the micro-computer model.

The objectives of the counselor training should insure that at the end of training, Counselors will be able to

1. explain the conceptual design and functions of AREIS;
2. provide a competent demonstration of the system to an Officer, a soldier, or a visitor;
3. explain ways in which the system will be integrated into the Education Center's ACES programs and services;
4. explain how, when, and where soldiers may use the system and of what use the system is to them;
5. use the Counselor-Administrator Subsystem, including building, updating, and deleting Forms 669;
6. localize designated frames of text;
7. transfer Forms 669 to another post and enter received forms into the system; and
8. identify the possible cause of operational problems.

In order to accomplish these objectives, thorough treatment must be given to the following:

1. detailed description and demonstration of the Soldier Subsystems
2. detailed description and demonstration of the Counselor/Administrator Subsystem, especially the functions related to Form 669
3. instruction and practice in localizing designated frames of text
4. "hands-on" use of all subsystems and Counselor functions
5. demonstration and description of a suggested demonstration package
6. proposed plan for integrating use of ARFIS into existing Education Center programs
7. detailed local plans for implementation and use of the system
8. instruction in possible operational problems and their method of solution.

These topics would be the same for both the distributed network and the micro-computer modes of delivery. The content related to topics 2 (especially the method of transmission of Form 669) and 8 (operational problems and their solution) would be different for these two models.

Clerical Support Persons: It is recommended that clerical support persons have a minimum of three days of on-site training. Depending upon the specific tasks to be assigned, the second and third days (topics 6-8) of training may not be necessary for all.

At the end of such training, clerical persons should be able to

1. explain accurately the conceptual design and functions of ARFIS;
2. provide a competent demonstration of the system to soldiers and teach them how to use it;
3. assist soldiers to arrange to use the system;
4. identify the possible cause of operational problems and describe their probable solutions;
5. operate all equipment;
6. localize designated frames of text;
7. build, update, and delete Forms 669;
8. transfer Forms 669 to another post and enter received forms into the system; and
9. start the system and sign it off.

In order to accomplish these objectives at a high level, the following must be addressed:

1. detailed description and demonstration of the Soldier Subsystem
2. detailed description and demonstration of the Counselor/Administrator Subsystem
3. "hands-on" experience with the soldier system
4. instruction about and demonstration of possible operational problems and how to correct these

5. instruction about the author language
6. sample work tasks in modifying text and/or creating new text
7. sample work tasks in building, updating, and deleting the computerized Form 669
8. instruction about how to use equipment and how to initialize and terminate the ARFIS software.

These same topics must be covered for both the distributed network model and the micro-computer model. The content of topic 4 (problems and their solution) and 7 (operation of equipment and system sign-on and sign off) would be different for the two models.

The reader will note that training for three functions (building, updating, and deleting Forms 669, modifying designated frames of text, and transmitting and receiving Forms 669) have been included in the training of both Counselors and clerical support persons. The decision about the assignments of specific tasks in regard to ARFIS will be made at the individual Education Center level, and will, therefore, vary from post to post. It is recommended, however, that these tasks be assigned to clerical personnel if there is sufficient staffing to do so. As the ACES Needs Assessment Survey indicated, Counselors are already performing a large number of clerical tasks and spending 9% of their time in doing so. A primary objective of the ARFIS system is to relieve Counselors of information-giving and clerical tasks.

Technical Personnel: The specific content of this section will vary depending upon the mode of technical delivery chosen (e.g., the distributed network model or the stand-alone microprocessor model). If the first delivery mode is utilized, it is assumed that the training will take place with assigned technical staff at the location where the sending computer is located. It is anticipated that one day of training will be sufficient and should make staff competent to

1. describe in general terms the conceptual design and functions of ARFIS;
2. demonstrate these functions to an officer, a visitor, or another technical person;
3. describe in detail the technical operational prerequisites of the system (e.g., core, disk storage, terminal, communication, and response time requirements);
4. describe possible operational difficulties and solve them;
5. perform the update process;
6. perform the transmission of Forms 669 to other posts;
7. state the specific contact persons in Education Centers with whom they should relate and procedures for doing so; and
8. understand the critical nature of support and maintenance of an on-line system.

The technical person(s) assigned to the operation and maintenance of ARFIS in the distributed network model would be individuals with training as computer operators and systems analysts. Their specific tasks would be: 1) initial installation of the AREIS software; 2) monitoring of daily operation and solution of any problems related to that operation; 3) installation of update tapes; 4) interface with a designated person at each Education Center; and 5) interface with equipment vendors and phone company.

In order to meet these objectives, the following topics must be addressed:

1. general description and demonstration of the conceptual design and function of the system
2. description of a suggested demonstration
3. instruction about and documentation of requirements, performance, maintenance, and problem-correction of ARFIS software
4. description of a procedural plan for supporting sites which are linked to their computer
5. the unique features of an on-line system and the high relationship between good technical operation and user acceptance
6. instruction about the installation and testing of update tapes
7. instruction and practive in sending and receiving Forms 669 from other posts.

Since the technical operation of a microprocessor is much less complicated than that of a larger machine, it is anticipated that very few problems will be encountered in the microprocessor model and that technical support will be at a minimum. Nonetheless, someone designated by the FSO in each Education Center will have to be trained in the operation of the micro-computer. The topics which need to be covered in this training are:

1. general microprocessor concepts
2. how to initialize and terminate the ARFIS software
3. problems that can occur and how to solve them
4. how to install an ARFIS update tape when received from the Education Directorate
5. how to transmit and receive DA Forms 669
6. whom to contact in case of hardware or software problems which cannot be solved.

User and Professional Guides and Manuals

Four publications should be written in support of the implementation and maintenance of ARFIS: 1) Soldier (or User) Guide to ARFIS, 2) ARFIS Education Counselor/Education Service Officer Manual, 3) ARFIS Technical Manual, and 4) ARFIS Inservice Training Manual.

Soldier/User Guide

This should be a 6-10 page, attractive, clearly readable guide which is written for soldiers who use the system. The Guide should be placed by every terminal. It should contain the following sections:

1. A brief description of ARFIS and of each of its subsystems.
2. Very clear instructions about the use of the equipment, with a graphic design of the terminal keyboard, highlighting the special keys (such as "enter" and "print") necessary for ARFIS use.
3. A copy of the World of Work Map with clear descriptive material and occupational and MOS lists to supplement the description and interest inventory in Subsystem II.
4. Suggested next steps or resources to assist with education planning after use of ARFIS.

The Education Counselor/ESO Manual

This should be a 35-50 page professional manual for Education Counselors, Education Service Officers, and clerical assistants. This manual should be a complete description of the system in non-technical vocabulary and should serve as a reference manual for any questions about content, mechanics of use, and/or suggestions for incorporation into the Education Center program. This Manual should address the following topics:

1. the purpose of the system
2. how to operate the system, including both the Soldier Subsystems and the Counselor/Administrator Subsystem
3. detailed description and documentation of each subsystem
4. suggestions for incorporating ARFIS as a part of the overall program of the Education Center
5. procedures for updating designated frames of text in ARFIS
6. procedures for building, updating, and deleting Forms 669
7. procedures for sending and receiving Forms 669 between posts
8. procedures for problem solution.

Technical Manual

Assuming the distributed network model, this should be a 25-50 page document for data processing directors, systems programmers, and computer operators. This publication should be complete technical documentation in data processing language. It should serve as a reference manual for system installation, maintenance, and problem solution. It should address the following topics:

1. brief conceptual description of ARFIS and its functions
2. a detailed technical description of the authoring software and of ARFIS
3. Requirements of core, disk storage, telecommunications, and terminals
4. procedures for applying update tapes
5. procedures for modifying or adding frames of text at the local site
6. procedures for building, updating, deleting, and transmitting (to other posts) Forms 669.

If the micro-computer model is adopted, a much shorter document would be required. Since it is anticipated that the primary support person would be a Counselor, all of the topics mentioned on the previous page (except 3 which would be irrelevant in this model) would be covered in the ESO/Counselor Manual. The only additional topics which would be necessary are basic concepts of a micro-processor, how to initialize and terminate the ARFIS system, problems which may occur and their solutions, and whom to contact for solution of problems beyond this scope. If the micro-computer model is adopted, it is suggested that these additional topics be added to the ESO/Counselor Manual. This would eliminate the need for a Technical Manual for the micro-computer model.

Inservice Training Manual

Inservice training must be a prerequisite for installation of ARFIS on all Army posts. As was mentioned earlier, such training might be provided by designated personnel from the Education Directorate, by a subcontractor, or by Education Service Officers (after they have been trained). With any one of these alternatives an Inservice Training Manual, prepared by the developers of the system, would be valuable as a suggested training model. This Manual should contain:

1. suggested training program, complete with objectives and specific content, for Education Service Officers
2. suggested training, complete with objectives and specific content, for Education Counselors
3. suggested training, complete with objectives and specific content, for clerical employees
4. suggested training, complete with objectives and specific content for data processing technical personnel (for the distributed network model only)
5. suggestions about length, environment, and procedures, for training
6. suggested transparencies for use in training (to be duplicated from this manual).

Publicity

Continuous publicity of the availability of ARFIS for soldier use will be very important to its general effectiveness, cost justification, and good utilization of computer resources and equipment. This is especially true on posts where there is a constantly changing soldier population and/or relatively isolated Education Center or ARFIS terminal location. High utilization of terminals is critical to providing the desired assistance with educational planning to soldiers and to cost justification. Cost is calculated by dividing the total cost for computer resources, telecommunication (if any), and terminal devices by number of users per month or per year. Number of uses is directly related to number of terminals and the number of hours per day terminals are on.

Three potential types of publicity for the system are human communication, printed materials, and non-print media.

Human Communication

The best mode of publicity for the system will be personal communication, and this should be operating at three levels. First, soldiers who are satisfied users will tell other soldiers about their experience and bring them in to use the system. This method should be highly encouraged. Second, Counselors should tell soldiers about the availability and content of the system as they see them in one-to-one interviews and in group meetings. Third, Education Service Officers and Commanding Officers should inform soldiers about the usefulness of the system and, if possible, provide them with a demonstration.

Printed Materials

It is recommended that ARFIS be publicized in at least four ways, as follows: 1) in a brief, attractive brochure which can be given to soldiers during initial orientation to the post and/or when they see Counselors, 2) through additions to existing documents about ACES at the Education Directorate, command, and post levels, 3) through periodic special coverage in the Army-wide and post news publications, and 4) through announcements and/or posters which are located in a variety of obvious places on posts.

Non-Print Media

ARFIS could also be publicized by means of periodic announcements on the post radio or television stations and by a special audio-visual presentation. Ideally, the latter would be a coordinated audio-tape and set of slides in a carousel tray. Slides, rather than a video tape or video disk, will allow localization of the program for a given post, if desired. The audio-visual presentation might well describe the system by presenting three or four soldiers with differing education planning questions and how the system helped them to find answers. The end of the presentation could give specific instructions about how to arrange to use the system and where the terminals are located. This section could be localized by the production of two or three slides which give information about the local setting. The presentation could be made available to all Education Centers and could be used by Counselors and ESO's in a variety of group presentations. The brochure about ARFIS, described earlier, could be given to soldiers at the time of this presentation.

Communication

Another kind of support service which is critical to the smooth functioning of ARFIS is communication. This communication is particularly critical between the Education Directorate, MACOM Education Divisions, and Education Centers.

Since ARFIS contains information from DA for soldiers and for ESO's and Counselors, it is critical to develop communication links and procedures which assure that the latest information from DA which affects the content of ARFIS be incorporated into the system for soldier and Counselor use as quickly as humanly and technically possible. A continuing high level of support for the ARFIS product from the Education Directorate must be maintained in order to enhance successful use at the local post level.

The communication between posts is likewise critical since soldier records are being transmitted, as well as information about course offerings and degree programs at receiving posts. Communication links and procedures must be developed and continuously oiled in order to assure smooth transition of records and accuracy of information.

The third critical area of communication is between Education Center personnel and the technical personnel assigned to the installation, operation, and maintenance of the system. Counseling personnel and data processing personnel traditionally speak a different language and seldom understand the problems and mission that each has. The stand-alone microprocessor mode of delivery will minimize the interdependence of these two groups because of the ease of operation and maintenance of a microprocessor, because it is dedicated to one function only, and because of the almost fail-safe quality inherent in this mode. If the distributed network mode is utilized, the need for communication between Education Center personnel and data processing technical personnel will be increased considerably.

The following kinds of understanding are critical:

1. If a distributed network mode of delivery is used, there must be clear assignments of responsibility so that one person at the Education Center and one person at the Data Processing Center are responsible for installation, maintenance, and smooth operation of ARFIS. These lines of responsiblity and communication must be well defined.

2. Data processing technical personnel must be made aware of the limited computer knowledge of most Counselors and other Education Center personnel. They must, therefore, communicate in non-technical language with a high level of willingness to support the operation of ARFIS.

3. Data processing technical personnel must be aware of the critical nature of an on-line operation. Response time must be good, or the user will soon become disenchanted. If the system experiences technical difficulty, immediate support must be given to problem solution so that the user at the terminal can be asked to wait five minutes or be immediately rescheduled if a solution does not appear to be imminent.

4. Data processing technical personnel must be aware of the critical nature of system updating and maintenance. When update tapes are received from the Education Directorate, it is essential that they be installed at the earliest possible moment.

These topics should be included, as proposed, in the inservice training of data processing technical personnel.

VII. EVALUATION DESIGN

Upon completion of the ARFIS system as conceptualized, it is recommended that an extensive field tryout of the system be conducted. The purpose of this field tryout would be twofold: a) to evaluate the completed system in order to make modifications if needed, and b) to test a design for continued evaluation of the system once it is implemented on a broad scale. In general terms, the launching of the proposed field tryout would involve the following steps:

1. Select a large Army post as field test site.

2. Install micro-computer(s), terminals, and a printer in the Education Center.

3. Provide inservice training, as described in this document, to Education Service Officers, Counselors, clerical support personnel, and a person (may be one of the Counselors) who is designated to be responsible for the operation of ARFIS and the micro-computer.

4. Implement full operation of the Soldier Subsystems and the Counselor/Administrator Subsystem for one year.

5. Monitor the evaluation procedures as described in the following pages through telephone conversation and brief on-site visits.

6. Collect and analyze data from these procedures.

7. Make inferences for possible modifications to the system.

8. Write a comprehensive field tryout report which includes recommendations for implementation of ARFIS on additional posts and a package of evaluation instruments for use in these sites.

During this proposed year of field tryout activity at least four types of evaluation would take place: the analysis of use patterns of both the Soldier and the Counselor/Administrator Subsystems; the analysis of user reactions; measuring the effect of use of the system by soldiers; and analysis of the impact of the system on ESO, Counselor, and clerical roles.

Analysis of Use Patterns

This method consists of monitoring who uses the system and where (if terminals are available in more than one place). It is recommended that a monitoring function be built into the software which allows the tally of users by such variables as subsystem, sex, rank, time in service, minority group, and terminal number. These

data should be accumulated without linkage to individual soldier records and should
be capable of on-line retrieval by ESO's or Counselors at any time. Such data
would allow the analysis of use patterns and the encouragement of different use
patterns if appropriate. The software should also allow the deletion of this
material in order to start the tallies over again at the discretion of the local
site. The presence of printers in the terminal configuration would allow the
printing of these data at Counselor/ESO discretion. A similar tallying system
should be built into the Counselor/Administrator Subsystem so that the frequency
of use of specific functions can be monitored.

Analysis of User Reactions

An on-line questionnaire was developed for the preliminary short tryout
of AREIS at Fort Sill, OK (Rabush, 1980). It is recommended that this instrument
be further refined, tested extensively in the proposed field tryout of the entire
system, and ultimately included as a part of the system for all sites. Sample
questions from this instrument are as follows:

* At this point, I have

    1. No idea about my educational plans.
    2. Some vague ideas about my educational plans.
    3. Narrowed my educational plans to 1 or 2 possible types of
       training.
    4. Selected one program for more education or training.

* For help with my job planning, a computer could be

    1. Very useful
    2. Useful
    3. Undecided
    4. Not very useful
    5. Not at all useful

It is suggested that some items be administered upon completion of each
module of the system and that other more general questions be asked only after
the first and perhaps some subsequent use of the system by a soldier. The
responses should be aggregated and displayed on-line at Counselor/ESO request.
Further, batch programs should be developed to print summary data at locally
determined intervals in a clearly readable format.

Effects of Use of System

A sample of at least 200 soldiers should be randomly selected. Half of this
sample should be randomly assigned to the experimental group, and half to the
control group. The control group should not be allowed to use AREIS during
the period of the study. In order to test the variables proposed, the study should
be at least one calendar year in length. The experimental group should be asked
to use AREIS in its entirety over a period of one month. Data from both groups

should be analyzed on the following variables: promotion rate, retention rate, use of education benefits in the Army, use of other Education Center services, and satisfaction with education services. Means of the experimental and control groups should be tested for significance by analysis of variance.

Impact on Personnel Roles and Soldier Behavior

The effective use of AREIS on a post Education Center should impact that operation. At least two areas of impact should be assessed: changes in the role and function of the FSO, Counselors, and clerical staff and changes in soldier participation in other Education Center activities.

Change in roles might be identified through answers to questions like the following, collected through questionnaires or structured interviews:

1. Does use of AREIS cause any change in the number of soldiers who come to Counselors?

2. What kinds of topics do AREIS users discuss with Counselors? At what level of specificity?

3. What kinds of perceptions do Counselors have about a change in role? FSO's?

4. Do the Counselor/Administrator functions reduce or increase the amount of clerical work required of Counselors? FSO's?

5. Does use of AREIS for general information allow Counselors to see a larger percentage of their assigned load?

6. How well is the system accepted by Counselors and FSO's? And for what functions?

7. What do soldiers do about education/vocational exploration after use of AREIS?

8. How has AREIS changed the job duties and role of clerical personnel?

9. How has the maintenance and transmission of Forms 669 been affected?

10. Who is responsible for operation, publicity, and incorporation of AREIS into the Education Center program?

11. Who is responsible for building, updating, and deleting soldier records?

12. Who is responsible for localizing frames of text or developing new ones?

13. Have any personnel been added or deleted because of AREIS?

In addition, Education Center activities should be monitored to ascertain whether the use of ARFIS effects an increase in the utilization of other available services, such as testing, correspondence work, enrollment in on or near-post courses, completion of degrees, use of career resources library, and individual appointments with Counselors.

Once this total plan of evaluation is developed and tested in the field tryout acitivity, it could then be utilized on all posts where ARFIS is installed. Because of the difficulty of experimental-control group design in a real-life setting, it might be necessary to implement this part of the proposed evaluation on only four or five selected posts which have different types of target populations, are of widely differing sizes, and are in different geographic zones.